REPORT ON INTER-EXPERIMENT STATION LOG GRADING CONFERENCE

Feather River Branch Station

and

Blacks Mountain Experimental Forest

California

November 27-29, 1939

Prepared by

California Forest and Range Experiment Station

Final Program

INTER-EXPERIMENT STATION AND REGIONAL LOG GRADING CONFERENCE

Feather River Branch Station and Blacks Mountain Experimental Forest

California

November 27-29, 1939

Monday, November 27

At Feather River Station

Morning Conference room — Director, E. I. Kotok, Chairman

8:00 - 8:15 Call to order. Reasons for and objectives of conference. Chairman

8:15 - 8:30 Some prerequisites for arriving at a common grading system. Director S. N. Wyckoff

8:30 - 9:00 The research approach to the problem and what research needs in log grading rules. Director M. I. Bradner

9:00 - 9:45 Northern Rocky Mountain Station — I. V. Anderson

9:45 - 10:30 Pacific Northwest Station — J. E. Lodewick

10:30 - 10:40 Recess

10:40 - 11:25 California Station — M. R. Brundage

11:25 Discussion

Afternoon In the field at Feather River Station

Field demonstration and comparison of different log grading systems.
M. R. Brundage, J. E. Lodewick, I. V. Anderson

Evening Conference room. — Director S. N. Wyckoff, Chairman

7:30 - 7:45 The Washington Office and Forest Survey slant. R. E. Marsh

7:45 - 8:00 The Forest Products Laboratory viewpoint. C. V. Sweet

8:00 - 8:20 The needs of Forest Service Timber Management men, Regional and National Forest, in respect to log grading rules. Logging Engineer J. R. Berry

Evening (Cont'd)

8:20 - 8:35 The needs of State and Private Forestry
E. T. Wohlenberg

8:35 - 8:50 The industry viewpoint.
Western Pine Association representative

8:50 Discussion

Tuesday - November 28

All day Field at Blacks Mountain.

Field demonstration and comparison of the different systems applied to the same stand of trees.
M. R. Brundage, J. E. Lodewick, I. V. Anderson

Wednesday - November 29

At Feather River Station

Morning Conference room. Director M. I. Bradner, Chairman

8:00 - 10:00 Discussion of field results.

10:00 - 10:10 Recess

10:10 - 10:30 Can the various systems be welded into one and, if so, on what basis? T. J. Orr.

10:30 - 10:45 Log grades versus tree grades. I. V. Anderson

10:45 - 12:00 Discussion of unification of the rules.

Afternoon Conference room. Director, M. I. Bradner, Chairman

1:00 - 3:00 (or as necessary) Completion of discussion, followed by appointment by Chairman of a committee to carry out conference conclusions. Decision on procedure from there on.

3:00 Products has never had such a representative group in the field with it before. If the log grade discussion can be completed by the time indicated, it is suggested that this may be the best occasion we may ever have to settle where we go from here on the Logging and Milling Studies, out of which the log grades grow.

Some of the considerations are:

The Forest Service aim in such studies.

What studies shall the Forest Service continue to do and what turn over to industry?

What types of data to gather?

Big studies versus little ones.

Attendance

Anderson, Irvin V.	N. R. F. & R. E. S.
Baker, Arch	Fruit Growers Supply Co., Susanville
Berry, J. R.	R-5
Bradner, M.	N. R. F. & R. E. S.
Brandstrom, A.	P. N. F. & R. E. S.
Brenneis, A.	Lassen N. F.
Brundage, M. R.	N. E. T. S. A.
Burks, Geo.	C. F. & R. E. S.
Connaughton, Chas.	R. Mt. F. & R. E. S.
Dunning, D.	C. F. & R. E. S.
Ericksen, L. N.	C. F. & R. E. S.
Ericson, O. F.	R-6
Hasel, A. A.	C. F. & R. E. S.
Hastings, Lem.	Red River Lumber Co.
Hill, C. L.	C. F. & R. E. S.
Josephson, H. R.	C. F. & R. E. S.
Koch, Elers	R-1
Kotok, E. I.	C. F. & R. E. S.
Krueger, M. E.	Univ. of Calif., Division of Forestry
Lodewick, J. E.	P. N. F. & R. E. S.
Martin, C. S.	Western Pine Association
Marsh, R.	W. O.
Mowat, E. L.	Intermt. F. & R. E. S.
Oliver, Tom	Fruit Growers Supply Co.
Orr, T. J.	C. F. & R. E. S.
Pearson, G. A.	S. W. F. & R. E. S.
Person, H. L.	C. F. & R. E. S.
Rogers, D. N.	Plumas N. F.
Stevenson, Geo. E.	R-6
Sweet, C. V.	F. P. Lab.
Tilley, W. B.	Western Pine Association
Wagner, Roy	R-5
Walker, Kenneth	Red River Lumber Co.
Welder, W. A.	Red River Lumber Co.
Wohlenberg, E. T.	R-5
Wyckoff, S. N.	P. N. [illegible] S.

General

In order to review collectively the logging and milling study programs of the several regional forest experiment stations and to consider the practicability of formulating into one standard set of log rules for ponderosa pine the tentative rules developed individually by each station, an inter-station log grading conference was held at the Feather River Branch Station, California, November 27-29.

In attendance were representatives of all of the western forest experiment stations, western regional offices, the Washington office, the Forest Products Laboratory, the Division of State and Private Forestry, the University of California Division of Forestry, and the industry.

Summary of Conclusions

The conference resulted in valuable interchange of ideas on the subject of logging and milling studies, their objectives, methods of approach and technique employed. In spite of the fact that studies by the different experiment stations have been conducted more or less independently of each other the tentative log grades set up by each correspond quite closely, and it was agreed that it should be practicable to formulate a single standard set of rules for ponderosa pine which would be applicable over its entire range and suitable for use in the purchases and sales, and for general appraisal purposes. To effect this, a committee of three, one from the Northern Rocky Mountain Station, one from the Pacific Northwest Station, and one from the California Station, was appointed to meet in Portland December 17 for the purpose of preparing a detailed set of rules. The rules will then be submitted to all interested parties, with the recommendation that they be adopted into general use.

It was further agreed that where the need for more refined grades existed, such as for research purposes, precutting agreements and special studies, such refined grades be set up as subdivisions of the standard grades, thereby making them subject to incorporation into the standard grades and putting them on a comparable basis.

Not of least value was the opportunity for exchange of ideas between the various groups represented and the correlation of their interests into the general problem.

DIGEST

Monday morning, November 27 - E. I. Kotok, Chairman.

Opening statement by E. I. Kotok, Director, California Forest and Range Experiment Station.

Mr. Kotok outlined objectives of conference, to consider questions of log grades, their purpose and uses, and to correlate work of different stations, consider possibility of unifying log grades, for appraisal and sales purposes and for use as basis in the industry of buying and selling logs. Subject of logging and milling studies also to be considered. Also outlined the interest of various groups in subject of log grades. He then suggested that if some definite policy or line of action could be set up at the conference, that a subcommittee be appointed to work out the details of the proposed log grades. The problem should be approached with an open mind with the hope of finding a common denominator in log grading.

On the subject of logging and milling studies Kotok sketched their history, and a possible basis for determining future policy concerning such studies.

1. Earlier studies were designed to facilitate better stumpage appraisals.

2. Subsequent studies tended to point out to operators that the values returned from small material were less than its conversion cost.

3. Approach to future problems should be to contribute to a fund of common knowledge on the subject to the benefit of the public interest; i. e. to all interested agencies both public and private.

The stations are not competent nor in a financial position to undertake all the needed studies - nor can industry be expected to undertake the entire job. The free interchange of ideas is necessary to establish principles of sound forest practice. It is hoped that the conference will bring out the part to be played by the Experiment Stations in solving the problem.

Some Prerequisites for Arriving at a Common Grading System

By Stephen N. Wyckoff, Director, Pacific Northwest Forest and Range Experiment Station.

Certain questions need to be considered before we can hope to arrive at a common system of log-grading.

1. The necessity of an open mind.

2. The inherent variability of ponderosa pine timber throughout its wide commercial range.

3. Is a common set of grades desirable?

4. Do we all mean the same thing when we say log grades?

Three stations have each worked out its own log grading systems. But if each comes here to persuade everyone that its system is the only best, success in getting together is doomed. In respect to the timber, the extreme variation in ponderosa pine through its wide range may make a single set of grades impossible, or it may not. We must not take either answer for granted, but must seek the facts.

Assuming that we are approaching the problem with an open mind, that there should be uniform grades, and that a common understanding has been reached — what do we want? The fundamental principle which should guide the formulation of grades is that the simplest answer which will yield the desired results is the best answer. Grades should be easy to learn and easy to use.

Is the need of research in respect to log grades different from or more refined than the needs of industry or forest administration? If so, the results of grading by research rules should be expressed in such terms that they can be put together into the standard grades.

The Research Approach to the Log Grading Problem

M. I. Bradner, Director, Northern Rocky Mountain Forest and Range Experiment Station.

The research objective in log grading is to recognize the differences in quality with reference to yield of lumber and other allied products.

In extending the results of studies to other stands it has been demonstrated that log and tree size alone is an insufficient criterion of log or tree value. As early as 1916, a letter from the Washington office of the Forest Service called for the establishment of uniform log grades between regions, and required that all logs should be graded, except in those regions where uniform log grades did not exist.

When studies were made in Region 1 in 1924 no established log market existed, and the attempt to establish log grades at that time was for the purpose of supplying needed information to forest administration with respect to the relationship between the value of the product and the appearance of the log.

At the present time tree grades are in use in Region 1 for,

1. Fir and larch with respect to tie and lumber yield.

2. Ponderosa pine with respect to lumber yield.

3. Idaho white pine with respect to match plank and lumber yield.

These grades have been formulated to provide a basis for economic forest management.

It is possible that the needs of research will not be met adequately by commercial log grades. If so, research grades should not be fixed by rigorous definition, nor limited to a standard set of grades. Research should be free to revise its grades as needed, but, in so doing, should keep such revision tied back to the commercial set of log grades.

I. V. Anderson. Pointed out variability in ponderosa pine from British Columbia to Mexico - California to the Black Hills. Agreed that we do find variability in quality and growth habits. Can we determine whether we can or cannot build a uniform set of grades applicable over the entire range?

Kotok. Pointed out that the main purpose of the meeting was to consider feasibility of such standardization.

The Northern Rocky Mountain Log Grades

I. V. Anderson, Senior Forester, Northern Rocky Mountain Forest and Range Experiment Station.

One of the first questions that must be answered in connection with log grades is "What are our objectives?" In this respect it may be helpful to trace the development of log grades.

The 1914 log grades developed in Region 1 were not based on mill production studies, but set about to define logs on the basis of their appearance. There were three grades:

1. Clear logs.

2. Shop logs.

3. Rough logs.

Recently log grades have been replaced by tree grades in Region 1 because it has been found that tree grades will meet the needed objective with considerable saving in analytical work.

The purposes and objectives of log grading are these:

1. To measure the value of the log as related to its surface appearance. If we know the value of logs, we know how much value we must forego to meet silvicultural requirements.

2. To measure the production of different grades of logs in terms of products yielded. The ultimate product must receive primary consideration.

3. To apply these measured characteristics of value to the silvicultural management of the forest.

Concerning the use of commercial log grades, formerly there was only a small log market. At the present time, however, log transactions in the Inland Empire amount to 170 million feet annually.

Kotok. Is quality a factor in these transactions?

Anderson. Quality is a factor depending upon the condition of the lumber market. Under good market conditions lower values will be used than under poor market conditions. The principal use of quality as a factor is in differentiating between acceptable and non-acceptable logs.

Kotok. Log grades could be formulated with the desire to establish an equitable basis for sales of stumpage and logs. An objective of the timber owner would be to sell on a quality basis. We're likely to have that question when mills begin to buy second-growth timber.

Question. Isn't it true that no sales on a log grade basis are in effect?

Anderson. Sales are on the basis of a woods run average. No appreciable difference in payments for stumpage on the basis of quality.

Wyckoff. No sales are in effect on the basis of log grades.

Anderson. Emphasized need of log grades from the standpoint of the timber owner. Private timber sales recognize only two classes of logs — good or cull.

There is an increasing need for the use of log grades as more and more sales of timber are made on a contract basis. There is also the question of recovery from second-growth timber.

From the standpoint of research, the door should be open for the number of grades which may be developed to meet specific needs. If we are interested in urging selective utilization, some correlation must be shown between economics and silviculture.

Resume of the Northern Rocky Mountain Grades

A. 1914 log grades were defined in terms of lumber yield:

1. Clear logs were practically clear logs, 10 ft. long and longer which would cut principally (50% or more?) No. 2 Shop and Better.

2. Shop logs - logs 8 ft. and longer which would produce 33-1/3% No. 2 Shop and Better.

3. Rough logs - logs 6" d.i.b. by 8 ft. and longer. Had limiting defect specifications but nothing on knot size.

B. On the basis of the 1925 general mill study, the following definitions of log grades were evolved:

1. Clear logs - logs 24" or over d.i.b. - logs must be practically surface clear with no evidence of knots. It will yield 25% or more of Selects.

2. Shop logs - 20" d.i.b. or over, consisting mostly of larger logs, butt and middle cuts - yield 30% No. 2 Shop and Better.

3. Rough or Common logs - 6" or over in d.i.b., a catch-all grade which included the small-knot common type.

C. 1932 Grades, Basis A.C.M. Studies:

One grade added at this time:

1. Select logs - 90% over 14" d.i.b. and from trees over 18" d.b.h. Lumber yield 25% or more D and Better Select.

2. Shop logs - 91% over 19" d.i.b. and over 90% of shop logs from trees 26" d.b.h. and over — yield 30% No. 2 Shop and Better.

3. Good Common logs - 95% from logs 18" d.i.b. and smaller. 90% of logs from trees under 25" d.b.h. Yield 50% No. 2 Common and Better with a large percentage of No. 2 Common.

4. Poor Common logs - All other logs yielding 50% No. 3 Common and Poorer.

D. Final Log Grades, 1937:

1. Same as 1932.

2. Same as 1932.

3. Took out off grade log.

4. Same as 1932.

5. Mixed Grade logs - Usually over 18" d.i.b. - not Select type — not Shop, because knots occur too frequently yet not coarse enough for Grade 4 logs.

E. Results of 4-Grade System compared to 5-Grade System. Basis — Lumber Code Authority Prices, 1934:

4 Grade System

	Grade 1	Grade 2	Grade 3	Grade 4	Average
Value per M log scale	$31.72	$26.27	$25.89	$23.68	$27.96
Value per M lumber tally	$28.26	$21.38	$21.20	$17.45	$22.84

5 Grade System

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Average
Value per M log scale	$32.57	$20.10	$28.70	$19.66	$28.54	$20.01
Value per M lumber tally	$29.99	$18.96	$22.37	$15.75	$19.96	$18.50

The Pacific Northwest Log Grades

J. Elton Lodewick, Senior Forester, Pacific Northwest Forest Experiment Station.

There are three fundamental features of log grades that must be considered in log grading:

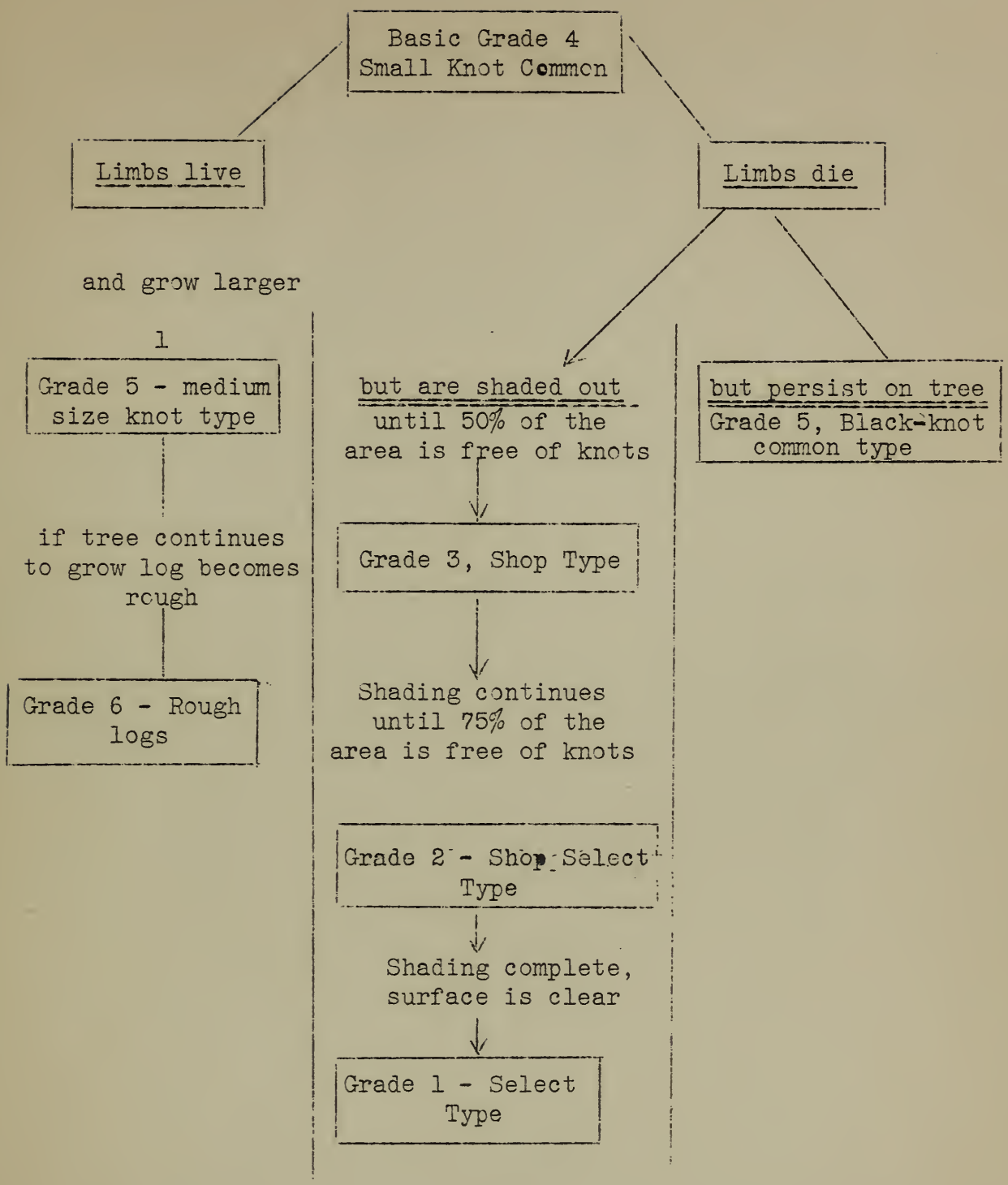
1. Log grades must be based on the surface appearance of the log.

2. The description of these grades must be simple.

3. The grades should permit the determination of lumber values and the yield of lumber grades. The results of earlier studies were not satisfactory when judged by these criteria.

The grades in use in Region 6 are described in the attached circular. (mimeographed).

The theory behind log grades is explained in the following chart. If we limit the discussion to butt logs for the sake of simplicity, it is obvious that the butt log is sufficiently young. As the tree grows older, changes in the limbs take place, and a change in the grade of the log takes place - as shown in the following chart.



On the strength of this reasoning, it is felt that grades which represent this natural evolution of quality should exhibit a progression of lumber yields. They should be simple, easily learned and applicable to standing timber. It is felt that the present Pacific Northwest Station grades do satisfy these wants.

The California Log Grading System

M. R. Brundage, Senior Forester, NETSA.

The 1914 system of log grades consisted of three loosely defined grades, Selects, Shop, and all others.

In 1929 on the Stanislaus study, 4 grades were recognized:

1. Select
2. Shop
3. Common
4. Rough

Subsequent studies pointed out the need for more grades, more accurate definitions, and for the recognition of defects other than knots, such as sweep, spiral grain, fire scars, lightning scars, bumps on the log surface, etc., in grading logs.

Details of the California Station system were explained in a mimeographed note distributed at the meeting.

Anderson's Grade 5 (mixed) will contain some logs which are in PNW and CAL grade 5. Some from CAL 4, PNW 3, and occasional logs from small knot common which are not typical.

Comparison Of Three Existing Grading Systems

By T. J Orr

California Forest and Range Experiment Station

Northern Rocky Mt.	Pacific Northwest	California
1. Select logs practically surface clear Yield 25%	1. Select logs - surface clear except for one pine knot Yield 40% Select	1. Extra Select - 92% surface clear - knot count limit 1. Yield 40% Select Count limit 2
	2. Logs 75% surface clear Yield 30% Shop 25% - 30% Select	2. Logs 75% surface clear - count limit 4 30% Shop, 30% Select
2. Shop		3. Logs 60% surface clear - count limit 8 45% Shop, 15% Select
	3. Logs 50% surface clear - yield 56% Shop, 5% Select	4. Logs 50% surface clear - count limit 16 Yield 55% Shop, 5% Select
	4. Small Knot Common Admits knots up to 1/6 the log d.i.b. if live	4. Small Knot Common Admits no knots larger than 0.2 D on 15" and smaller logs. Unlimited number if 80% or more live or recently dead.
3. Good Common		
	5. Poor Common Admits knots up to 1/3 d.i.b. if live, 1/6 d.i.b. if dead. Larger knots admitted if 1/3 area	5. Shop Common Count limit 32, but not over 24 LK and VLK. Unlimited number live medium knots 3" and over. Less than 20% dead and loose MK
4. Poor Common		
	6. Rough Coarse densely knotted	6. Rough but not over 48 count - 36 if LK and VLK

Monday evening, November 27 - S. N. Wyckoff, Chairman

Mr. R. E. Marsh, Acting Assistant Forester, Washington, D. C.

Mr. Marsh emphasized the growing importance of log grades, that they were becoming indispensable in many phases of forestry activities. They are necessary to carrying out of continuous yield operations, essential in forest resource studies, and in forest management. They are becoming increasingly important in view of the recognition of the need to express growth and yield in terms of quality as well as quantity.

The Forest Products Laboratory Viewpoint

C. V. Sweet

Laboratory interested in log grading as applied to Eastern and Southern woods.

Objective was to define commercial log grades - to set up accurate criteria by which the buyer and seller could estimate value of logs. They later entered into the subject of grading logs in the standing tree.

Each mill has its own definition of grades, and no uniformity exists between mills. Definitions uncertain in both pine and hardwoods.

Policy has been to set up three grades for each species of hardwood if basic data are available. There is a growing demand for commercial interests for that sort of thing.

Laboratory concludes that two sets of grades are needed — one for log transactions and one for standing tree appraisal. Requires separate study, as not feasible to carry two log-grading systems simultaneously.

Grading on same principle as grading lumber, hardwood and softwood shop lumber, i.e., on basis of clear areas between defects. Only approach to problem is by mapping surface and end defects accurately.

Perhaps there cannot be standard grades, but there should be standardization in approach. Can be analyzed by mathematical means.

Procedure is to divide into value classes, then see what kind of logs produce this value. This approach sound in theory and in practice.

In commercial grades some concern expressed about dispersion — elimination of this dispersion primary need in commercial work. Need three log grades for many species. Overlapping of value curves objectionable.

Needs of Timber Management

John R. Berry, Logging Engineer, Region 5.

Three fundamental principles of log-grading:

1. Log grades should be based on surface indications of defects.

2. Grades should account for visible defects.

3. Results should be expressed as lumber grade recovery.

Chart by John R. Berry

Reason for Log Grading	Grades Needed
1. Sale of Government stumpage	1. Select 2. Shop 3. High Common 4. Low Common
2. Pre-cutting exchanges or scenic strips	1. 2 Select Grades 2. 2 Shop Grades 3. High Common 4. Common and Low Common

Logging and Milling Studies Should be Placed on a Project Basis

O. F. Ericson, Logging Engineer, Region 6.

Favors Berry's four-grade proposal but sees no need in Region 6 for 7 grades.

Urges simplicity in formulating rules.

Elers Koch; Region 1.

Main problems involving log grades are commercial, such as pre-cutting agreements. Detailed analysis desirable by tree grades and sizes. In zero margin cuttings, log grading is the factor.

There is also the question of how left trees will behave, and what grade their several logs will be 50 years hence.

How about log grades instead of tree grades for determining value of standing timber?

E. T. Wohlenberg, Division of State and Private Forestry.

Cooperative studies are needed in economic approach to problem on fifty-fifty basis with operator, who also should share expense of compilation. Company men should take part in studies as training needed to put results into practice.

More refinement of grades may be necessary, but need for simplicity outweighs this need at present.

Operator needs to know values cut and left - data basic to selective logging system. Economic selection system has some silvicultural value, although may fall short of ideal.

Axel J. F. Brandstrom, Pacific Northwest Experiment Station.

Studies in Douglas fir on standard commercial grading system.

Lem Hastings, Red River Lumber Company.

Operators are interested in economic approach to forest management, and are particularly interested in determining tree values. Whatever is done with log grades, the procedure should be simplified as much as possible.

In commenting on defects to be considered, would expect some difficulty in detecting presence of pitch in standing tree.

C. S. Martin, Forest Engineer, Western Pine Association.

A rapid evolution in methods of logging has come about in the past three or four years in certain districts where supply of timber is short. There is an increasing development of what we may call a log market.

Last year:

(a) 350 million feet of stumpage purchased from ranchers and small timber owners, i.e., where ownership was 640 acres of timber-land or less.

(b) About 700 million from larger timber owners.

The role of log grades in the sale of timber is to furnish to the operator some control of the quality of his product, and from the viewpoint of the timber owner to provide an equitable basis for sale.

44% of the companies which are members of the Western Pine Association have made mill studies. The industry needs first four classifications such as proposed by Berry. There may be a need for 6 or 7 grades in the companies case. Grades should be basis for selective cutting.

Log grades offer a prospect of control of quality of yield by regulating the selection of trees and cutting those trees which yield logs which will produce a large amount of lumber which can be sold promptly.

The third angle is the correlating factor. Can we tie in the results of the three grading systems? Principles applying to studies, methods of approach etc. should be correlated to enable comparison of results.

Need of the industry for short notes on special phases of the problems — research notes and charts — reports should be brief, and publication of results expedited.

Krueger, University of California Forest School. Feels that curricula of forest schools may have overemphasized the aesthetic side of forestry overlooking importance of utilization phases — stress should have been laid on orderly harvesting and marketing of timber in connection with which log grades are of great value.

Industry should undertake studies of its own with more technical aspects of problem handled on cooperative basis.

Stephenson, R-6. Wants cost of harvesting considered in log grades.

Rogers, Supervisor, Plumas National Forest.

Reports sales on Plumas National Forest are based on log size for delivered logs.

Grade 1 - $14.00 per M B. M. log scale.

Grade 2 - $12.00 per M B. M. log scale.

Administration needs more information on log grades.

Wednesday morning, November 29 - M. I. Bradner, Chairman

Bradner. Called for Orr's report on prospects of combining the various systems into one.

Orr. Consensus of opinion seemed to favor setting up four main grades, i.e., Select, Shop, Common, and Box (later referred to as Low Common). Specifications for these grades based on Brundage's'knot counts' and on percent of clear surface were listed on the blackboard, together with the apportionment of present Pacific Northwest and Northern Rocky Mountain Experiment Station grades to these classes.

Anderson. Favored specifying size limits, particularly for shop type. 19 to 20 inches. Stevenson suggested 18 inches for minimum. Martin favored a set minimum for all grades.

Bradner. Shop type could be split into A, B, and C sub-classes. Likewise the other main types could be split so as to permit easy grouping when desired.

Appears to be general agreement on the practicability of establishing 4 basic grades.

Brandstrom. On size limitation favored flexibility to permit changes according to price changes. Need not use limits in the woods grading, but would regroup according to value in commercial grading. Martin did not favor shifting grades and limits back and forth. Anderson suggested omitting minimum limit from select, or at least leave the matter of limits up to each region. Martin wanted some standard limitation.

Berry. Wants (1) grade recovery for different types of logs, (2) specifications for commercial log grades which can include deductions for various defects and take log size into consideration. Descriptions for these two purposes might differ. Brundage favored one set of rules for standing tree log grades and another set for log selling purposes. Base grades on surface appearance in the standing tree grading. Take defect into account in commercial log grading.

Stevenson. How is the adoption of the proposed uniform standard grades going to affect reworking of data already secured? Orr and Lodewick stated that their data could be reworked quite readily.

Bradner. Following various suggestions regarding subdivision of shop and common grades, suggested that the committee of experts to be appointed get their data together and decide on the range to be included in each class and subclass. The committee to meet at Portland. Opportunity there to work together with the Western Pine Association. Sweet stated that the Forest Products Laboratory was much interested in this problem, but had nothing to contribute at present in working out the details of the standard rules.

Walker. In this region (California) shop is the most important grade. In the north more yard type boards are cut.

Lodewick. Pacific Northern Experiment Station is willing to make the necessary adjustments to arrive at a standard set of grades acceptable to everyone. Orr and Anderson say ditto. Berry says the 4 grades are satisfactory, but wishes to participate in the breakdown to subclasses. Felt that requirements for each grade should be stepped up a bit from those suggested.

Bradner. The committee should boil down the basic data first, and following that, timber management and all other interested groups should participate in reaching a final decision. Berry said Timber Management Division of Region 5 could make their slant clear to the committeeman from California.

Walker. Stressed need for simplicity so that the rules could be applied by others than experts in this particular line.

Pearson. Variations in timber between regions will require compromises to arrive at subclasses. In growing timber for the future the object should be to strive for clear high quality logs — hope to get away from rough logs. Keep number of grades to the minimum. In the future, under management there will be need for fewer grades than now.

Wohlenberg. Ease of application will assure more forestry in industry.

Bradner. Following recess, brought up question of time of committee meeting. Brundage suggested settling on a standard classification now, but Lodewick and Anderson wanted their data available before reaching a decision. Figure a minimum of 4 days, starting at Portland on December 17.

Anderson. Presented report on log grades versus tree grades. Simpler than log grades, working with a larger unit. In log grading in the standing tree it is difficult to count knots beyond the first few logs and not easy to divide the bole into separate logs. Correlation of silvicultural characteristics with economic factors. Described the characteristics of 6 proposed tree grades. Applications of this system has proven fairly easy. As an example, six junior foresters in Arizona were given the necessary training in two days. By this system it is possible to get the comparative value of stands in a short time. Values of trees in different tree grades may vary due to such factors as selling price of boards of varying width. Sometimes narrow boards sell for more than wide boards and at other times the reverse is true. Walker stated that this was largely due to the interplay of such factors as Government and union regulations applying to building construction. Anderson emphasized that tree grades were not meant to supplant commercial log grades. They would still be needed. Suggest tree grades in place of log grading in the standing tree. Brundage asked whether results from site 3 could be applied to site 1. Anderson thought it could because of same ratio of tip to butt. Berry suggested that 2 select logs on a poor site would make the tree comparable to one having four select logs on a good site.

Brandstrom. Illustrated on blackboard marking rules based on value curves. Cutting entirely on a value basis could identify values by means of grades. In considering future productiveness, the other factor, tree class, is taken into consideration in marking. Computations show how much recognition should be given to differential in growth rate. In productive stands the silvicultural factor is considered first and the value factor second.

Pearson. Wants simple understandable rules that we can get across to everybody. Our responsibility to the public is to make good lumber available at the lowest prices. If we don't accomplish this there will not be a lumber industry 50 years hence. Tendency now is toward lower quality at higher prices. We should think about and effect stand improvement. Put the idea of log grades into practice in growing timber.

Wednesday afternoon, November 29 - M. I. Bradner, Chairman

Bradner. Asked for summary of policy on logging-milling studies in the regions represented.

Anderson. Listed the variety of timber types encountered in Region 1. Most of the work has been done in Idaho white pine and ponderosa pine. Policy has been to cooperate with industry on these studies. Large studies in the past, but at present favor smaller studies for solution of particular problems. Aim of Products Division at Northern Rocky Mountain Station is to function as a service agency to timber management and to private operators.

Bradner. Funds for this work limited. Usually do have trained men available for helping other organizations. In the future will do more of this advisory work in connection with small studies.

Lodewick. In Region 6 logging studies are conducted separately from milling studies. No tie-back to particular trees. All studies have been large in the past. Interested in building up the log grading phase. At present no funds are available for large studies, and are inclined at any rate to favor small studies. The studies are made as need for them arises in timber management, State and Private Forestry Division, and in industry.

Brandstrom. Program now is to concentrate in the Douglas fir region, in which there is the coast type, cascade type, old and second-growth types, all of which represents a large task.

Hill. Business of the Forest Service is to bring about better woods practice. If interested only in high grading stands, the California Station would not participate in these studies. Work first started with the Stanislaus study in 1929. Would not repeat a study on that scale again. At present are tying mill studies into the work of the Blacks Mountain Experimental Forest. Willing to assist and cooperate on studies conducted by other organizations. It is for this reason that a manual on outline of procedure is being prepared.

Brundage. Better results have been secured from small studies. Need for tie of log to the tree for explanation of end values. Get more detailed information on small studies. Raised question as to how much educational or extension work should be done by research agencies.

Brandstrom. In the field, Pacific Northwest Station, worked out the application of marking rules with companies. Forest Management, and the Indian Service. Promotional end was most important part, but possibly station men should not need to continue with this end now.

Bradner. Not much promotional effort has been required of Research in R.1. Results worked out and turned over to agencies for use.

Lodewick. Promotion concerned mainly with forest management, state and private forestry, and others applying results on the ground.

Orr. Cooperation in the Blacks Mountain project, tying in with Silviculture and Management. Need other studies on the west side, in second growth, and in the redwood region. Strong for tie-back to trees in the field. Adjust size of sample to what is needed.

Sweet. The Forest Products Laboratory has conducted about 50 studies, mostly in small mills, during the past 15 years. This work was confined to regions not having products men in the experiment stations. No need seen for direct participation of Laboratory in western studies. The Laboratory would be glad to participate in more general problems, such as utilization of white fir and cedar.

Bradner. An example of a problem in which Laboratory assistance would be needed is the question of round versus square mine studies.

Bradner. Called for discussion by Regional representatives on the usefulness of woods and mill studies.

Koch. General studies not very applicable, and results are not put into practice on private cutting. Instead of cutting down to 18 or 20 inches, they cut to 12 inches. Studies run in a company's own mill are more apt to be relied upon by that particular company.

Ericson, Region 6. More actual application of improved methods since the experiment stations have taken over work and mill studies. Mill men in general are interested in those studies. Favors more smaller studies.

Berry. Since 1928 or 1929, studies have been conducted by the California Station. Personnel contributed by Timber Management, and the operator furnishes some personnel and use of the mill equipment. Anyone of the three cooperating agencies entitled to use of the data. Studies should be on a continuing, planned basis. The cooperative arrangement should be on a stable basis.

Wohlenberg. Need these studies and Division of State and Private Forestry is willing to cooperate with whatever organization makes them.

Martin. Benefits from large studies should not be minimized. Results started the ball rolling for better forestry practice. More trees left on cut-over areas. To be effective should have joint studies with the company having a representative on all phases from the ground up. Must be able to adapt results to apply to changed conditions. The company needs a qualified technician to do this. Some small trees must be cut, however, to get the usual percentage of #2 common stock, which in general marketing would be 10 to 12 percent. Private forestry will not advance much until the companies get their own technical staffs.

Walker. Need for balanced stock determines to some extent the kind of cutting. Lumbermen are apt to consider some figures from studies as largely propaganda. Foresters must be open-minded and the lumbermen must not be too skeptical of foresters' findings. Right now the problem is to develop for practical use a technique of getting quick results from small studies of, for example, 100,000 feet. Company's own men must have hand in these studies throughout. Need men with forestry knowledge to handle this.

Wohlenberg. In time find that good economics is good silviculture and vice versa.

Krueger. Seconds Martin's idea that the company needs a technician on studies from beginning to end. Must plan so that results can be interpreted for changing conditions.

Dunning. Agree with Pearson and Sweet, but cannot agree with Wohlenberg's statement. Private operators objectives and those of forest management are not the same. These studies are geared entirely to what the present type of equipment happens to be. Need to plan for other types of utilization. Would like to see conditions such that the lumbermen would like to cut all trees — even those of poorer quality and inferior species. Cannot have real forestry practice until this is brought about. To make such studies now, would need a small mill to supplement the bigger equipment. So far have not had true experimentation in these studies. Forest Service should have its own experimental small mills to do this.

Martin. Industry would not object to the Government's having small experimental mills. Walker agreed, if, for purely experimental purposes. Did not like idea of Government logging on any but a purely experimental basis.

Hill. Cannot see any objection to Government logging their own land and selling logs to private companies by the roadside. Cannot see that it offers competition to industry as long as the Government does not sell lumber.

Walker. Lumbermen fear Government competition with private industry. Not a Government function.

Hill. Question of getting results published promptly once they are obtained.

Bradner. Suggest multilithing in Station notes, or publication in The Timberman or other lumber periodicals. Preliminary results could be printed this way prior to appearance in bulletin form.

Field Demonstrations

Results of the field demonstrations of log grading in the standing tree are shown in tabulated form on the following pages. The grading was done on three bases:

by I. V. Anderson according to the grades developed by the Northern Rocky Mountain Experiment Station,

by A. J. F. Brandstrom according to the grades developed by the Pacific Northwest Experiment Station, and,

by M. R. Brundage according to the grades developed by the California Experiment Station.

To place the nomenclature of the three grading systems on a comparable basis, the following symbols were used to indicate the type of log to which the grade number refers:

Northern Rocky Mountain

Grade 1 - Select	S
Grade 2 - Shop	F
Grade 3 - Good Common	C
Grade 4 - Poor Common	PC
Grade 5 - Mixed	M

Pacific Northwest

Grade 1 - Select	S
Grade 2 - Intermediate	FS
Grade 3 - Shop	F
Grade 4 - Common	C
Grade 5 - Common	FC
Grade 6 - Rough	R

California

Grade 1 - Select	S
Grade 2 -	FS
Grade 3 - Shop Select	HF
Grade 4 - Shop	LF
Grade 4 - Common	C
Grade 5 - Shop Common	FC
Grade 6 - Rough	R

Table 1.- Standing tree log-grades assigned by the three regions to different trees by log position.

Feather River Branch Station

East Half, Butterfly Sample Marking Plot

Tree No.	DBH Height	System	Log Position 1	2	3	4	5	6	7	8	9	Tree grade or class
14	38	NRM	1-S	2-F	5-M	5-M	4-PC	4-PC	4-PC			2
	7	PNW	1-S	3-F	3-F	5-FC	5-FC	5-FC	5-FC			4A
	1/	CAL	3-HF	3-HF	4-LF	4-LF	5-FC	5-FC	6-R			5
18	24	NRM	5-M	5-M	4-PC	4-PC	4-PC	4-PC				5
	6	PNW	3-F	4-C	5-FC	5-FC	4-C	4-C				3C
		CAL	3-HF	4-LF	5-FC	5-FC	5-FC	5-FC				4
20	28	NRM	5-M	5-M	5-M	4-PC	4-PC	3-C				4
	6	PNW	3-F	4-C	4-C	5-FC	4-C	4-C				3B
		CAL	2-FS	3-HF	4-C	4-C	5-FC	5-FC				4
21	34	NRM	1-S	1-S	2-F	5-M	4-PC	4-PC	4-PC			1
	7	PNW	2-FS	3-F	3-F	5-FC	5-FC	5-FC	5-FC			3-A
		CAL	1-S	2-FS	2-FS	4-LF	5-FC	5-FC	5-FC			3
22	18	NRM	4-PC	CULL								6
	2	PNW	4-C	5-FC								3-D
		CAL	3-HF	5-FC								7
54	42	NRM	1-S	1-S	1-S	1-S	2-F	5-M	4-PC	4-PC	4-PC	1
	9	PNW	1-S	1-S	2-FS	3-F	3-F	4-C	4-C	5-FC	5-FC	3B
		CAL	3-HF	1-S	1-S	2-FS	4-LF	4-C	5-FC	5-FC	5-FC	3
60	28	NRM	1-S	5-M	5-M	4-PC	4-PC	4-PC	4-PC			5
	7	PNW	2-FS	4-C	4-C	5-FC	5-FC	5-FC	5-FC			3C
		CAL	1-S	3-HF	4-LF	4-C	5-FC	5-FC	5-FC			4
62	26	NRM	1-S	1-S	5-M	5-M	4-PC	4-PC	4-PC			1
	7	PNW	1-S	3-F	4-C	4-C	5-FC	5-FC	5-FC			3B
		CAL	1-S	2-FS	4-C	4-C	5-FC	5-FC	5-FC			3

1/ Butt log degraded for fire scars.

In the tree classes entered in the last column, the NRM are Anderson's, the PNW are Keene's, the CAL are Dunning's.

Table 2.- Standing tree log-grades assigned by the three regions to different trees by log position.

Feather River Branch Station

West Half, Butterfly Sample Marking Area

Tree No.	DBH / Height	System	Log Position 1	2	3	4	5	6	7	8	9	Tree grade or class
56	24 / 5	NRM	5-M	5-M	4-PC	4-PC	4-PC					5
		PNW	2-FS	5-FC	5-FC	5-FC	4-C					3A
		CAL	3-HF	4-LF	4-C	5-FC	4-C					3
62	34 / 7	NRM	1-S	2-F	5-M	5-M	4-PC	4-PC	4-PC			2
		PNW	3-F	3-F	5-FC	5-FC	5-FC	5-FC	5-FC			4A
		CAL	2-FS	4-LF	4-LF	4-LF	5-FC	5-FC	6-R			5
63	32 / 7	NRM	1-S	1-S	2-F	2-F	5-M	4-PC	4-PC			1
		PNW	1-S	3-F	3-F	3-F	5-FC	5-FC	5-FC			4B
		CAL	1-S	2-FS	3-HF	4-LF	4-LF	5-FC	5-FC			5
113	56 / 9	NRM	1-S	1-S	2-F	2-F	4-PC	4-PC	4-PC	4-PC	4-PC	1
		PNW	1-S	1-S	3-F	3-F	3-F	5-FC	5-FC	6-R	6-R	4A
		CAL	1-S	1-S	2-FS	4-LF	4-LF	5-FC	6-R	CULL	CULL	5

Table 3.- Results of log-grading field trials.

Blacks Mountain Experimental Forest

Control Plot 39 - 5

Tree No.	DBH / Height	System	Log position 1	2	3	4	5	6	7	8	9	Tree class or grade
2421	36 / 3	NRM	1-S	2-F	4-PC							5
		PNW	1-S	3-F	5-FC							4B
		CAL	1-S	4-LF	5-FC							5
2423	18 / 3	NRM	4-PC	4-PC	4-PC							4
		PNW	4-C	5-FC	5-FC							4C
		CAL	5-FC	5-FC	5-FC							7
2426	26 / 3	NRM	5-M	4-PC	4-PC							4
		PNW	5-FC	5-FC	5-FC							3B
		CAL	4-LF	5-FC	5-FC							4
2493	26 / 3	NRM	5-M	4-PC	4-PC							5
		PNW	5-FC	5-FC	5-FC							4B
		CAL	4-LF	5-FC	5-FC							5
2500	28 / 5	NRM	2-F	5-M	4-PC	4-PC	4-PC					5
		PNW	3-F	3-F	5-FC	5-FC	5-FC					4B
		CAL	2-FS	4-LF	4-C	4-C	5-FC					5
2506	30 / 5	NRM	1-S	2-F	2-F	4-PC	4-PC					5
		PNW	2-FS	2-FS	3-F	3-F	5-FC					3B
		CAL	1-S	3-HF	4-LF	4-LF	5-FC					3
2510	30 / 3	NRM	5-M	4-PC	4-PC							3
		PNW	5-FC	5-FC	5-FC							2A
		CAL	5-FC	5-FC	5-FC							1
2522	36 / 5	NRM	1-S	5-M	4-PC	4-PC	4-PC					5
		PNW	3-F	5-FC	5-FC	6-R	6-R					4A
		CAL	3-HF	5-FC	5-FC	5-FC	6-R					5A
2524	20 / 2	NRM	4-PC	3-C								3
		PNW	4-C	5-FC								2A
		CAL	5-FC	5-FC								1
2531	52 / 4	NRM	2-F	5-M	4-PC	4-PC						5
		PNW	3-F	5-FC	5-FC	6-R						3A
	Fork	CAL	3-HF	5-FC	5-FC	6-R						3
2592	38 / 5	NRM	2-F	5-M	4-PC	4-PC	4-PC					5
		PNW	3-F	5-FC	5-FC	5-FC	6-R					4A
		CAL	4-LF	5-FC	5-FC	5-FC	6-R					5A
2594	40 / 5	NRM	1-S	4-PC	4-PC	4-PC	4-PC					5
		PNW	2-FS	5-FC	6-R	6-R	6-R					4C
		CAL	2-FS	6-R	6-R	6-R	CULL					5

Ponderosa Pine Log Grade Descriptions as reworded on November 1, 1938

Pacific Northwest Forest and Range Experiment Station
Portland, Oregon

Grade 1

Shall be smooth and surface clear without indications of knots near the surface, providing, however, that 1 pin knot is permissible any place on the log.

Grade 2

Shall be smooth and surface clear on three faces but with knots permissible on the fourth face; or shall be smooth and surface clear on the lower three-fourths of the length, above which a few knots are permissible; or shall be smooth and surface clear to within 2 feet of the upper end, above which any number of knots are permissible. In any case 1 pin knot is permissible on the clear portion of the log.

Grade 3

Shall display knots which may vary from small black knots to large sound or unsound knots but which are spaced at least 3 feet apart (longitudinally) when the knots are staggered or 6 feet apart when they are in solid whorls. The surface clear areas must aggregate at least 50 percent of the total surface of the log, provided that each clear area must be at least 4 feet long by one-fourth the circumference in width.

Grade 4

Shall display numerous small and medium-sized red (live) knots, provided, however, that black (dead) knots which in the grader's judgment will cut out sound beneath the surface (usually on black barked logs) are permissible. The size of the knots shall be proportionate to the size of the log. For a 12-inch log 2-inch live or 1-inch dead knots and for a 24-inch log 4-inch live or 2-inch dead knots are permissible. An average longitudinal spacing of not less than 2 feet shall be required for logs with maximum knot sizes.

Grade 5

Shall display numerous live and/or dead knots, the maximum size of which shall be proportionate to the size of the log. For a 12-inch log, 4-inch live and 2-inch dead knots, and for a 24-inch log, 5-inch live and 3-inch dead knots, and for a 36-inch log, 6-inch live and 4-inch dead knots are permissible. An average longitudinal spacing of not less than 2 feet shall be required for logs with maximum knot sizes.

Logs with larger knots shall also be admitted to this grade if their surface clear areas aggregate at least one-third of the total surface of the log, provided that each clear area must be at least 3 feet long by one-fourth the circumference in width.

Grade 6

Shall be rough, coarse or densely knotted logs unsuited to any of the previous grades.

General Considerations

Foregoing specifications as to spacing between knots refer to distance between knot or limb edges rather than from center to center.

Defects for which deductions are made in scaling shall not be considered in determining log grades.

Standing trees shall be graded on the basis of 16-foot logs and each log shall be graded solely on the basis of its own grade characteristics, i.e., the grade characteristics of adjoining logs shall not be allowed to influence the grader's judgment.